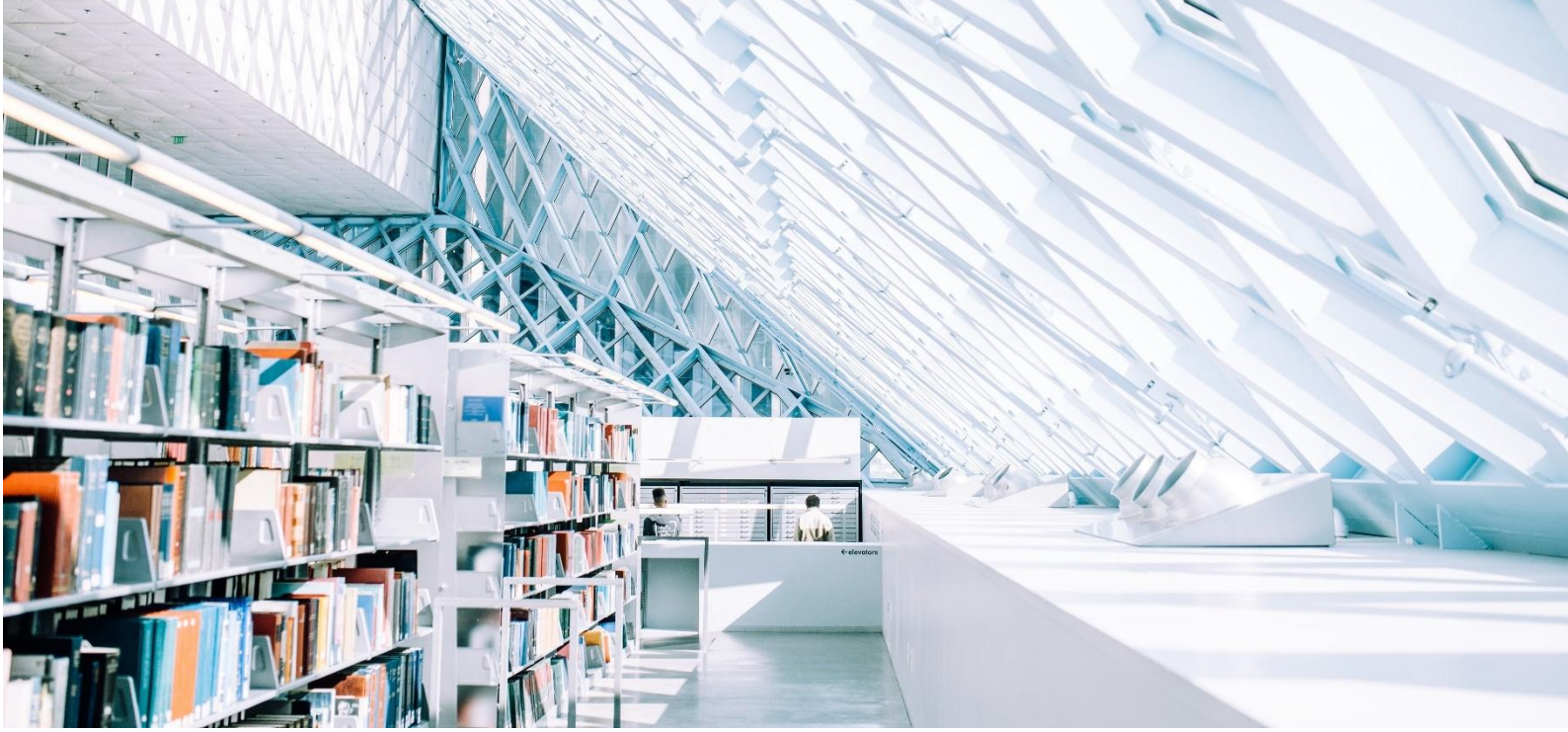
SCI/Verkehr

DIESEL AND ALTERNATIVE DRIVE LOCOMOTIVES

Global Market Trends

2025



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DIESEL AND ALTERNATIVE DRIVE LOCOMOTIVES
Global Market Trends 2025

Hamburg, December 2025

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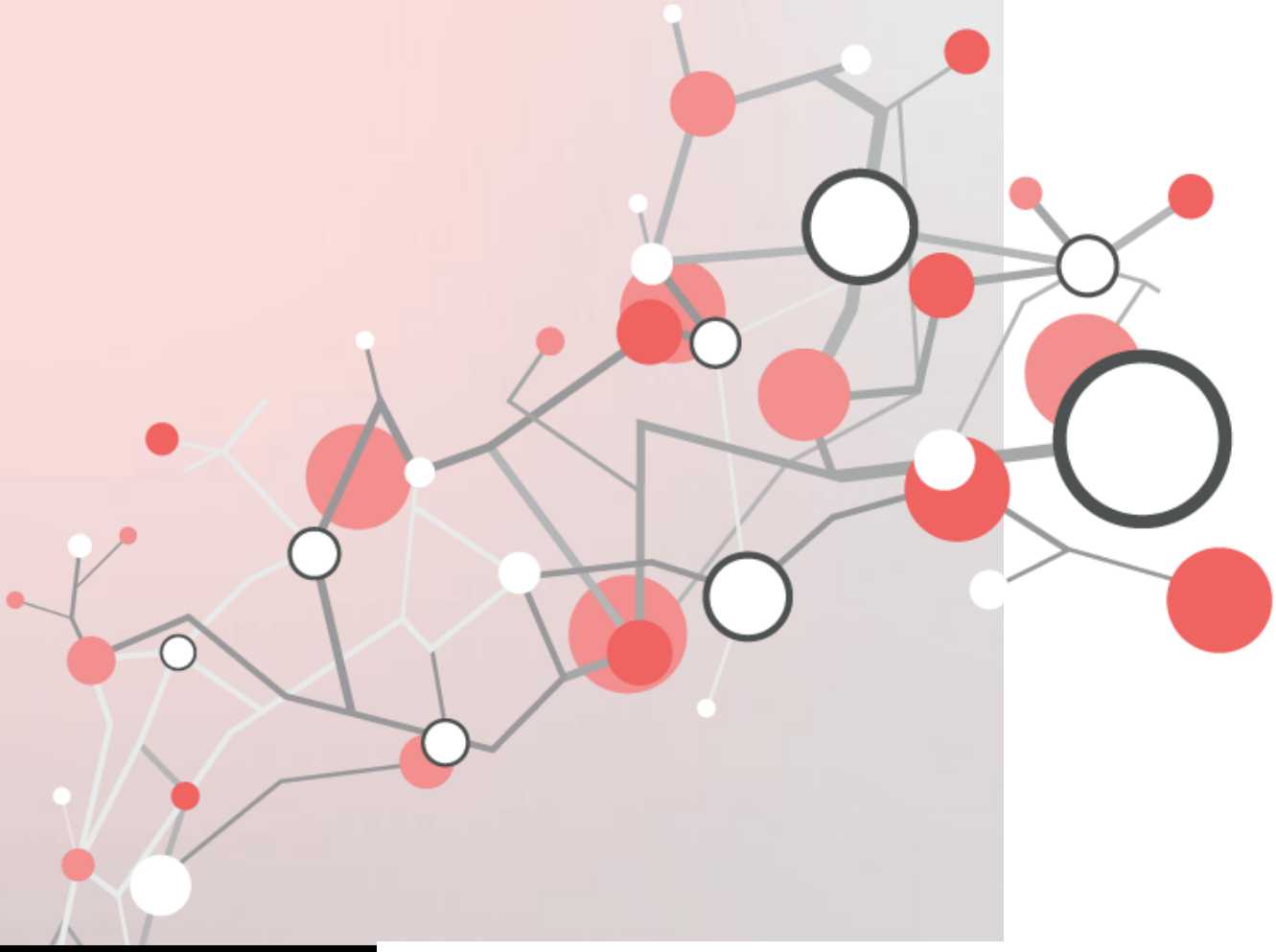


1 Executive Summary

Executive Summary

Analysing the locomotive data stored within the SCI Database reveals that in 2025, the global railway market – predominantly in the freight segment – is still xxx dependent on diesel traction. The large **diesel locomotive** fleet of more than xxx,000 units represents **~xx% of the global locomotive fleet**.

(…)

World – diesel and alternative drive locomotives		Mainline	Shunting	Total	Trend
	Installed base: Units 2025	xx	xx	xx	
	Installed base: Average development 2025-2030 (p.a.)	xx	xx	xx	xx
	Installed base: Average age 2025 (in years)	xx	39	xxx	
	OEM market: Average volume 2025 (EUR m p.a.)	xx	xx	xx	
	OEM market: Average development 2025-2030 (p.a.)	xx	xx	xx	↗
	OEM market: Average volume 2030 (EUR m p.a.)	xx	1,xxx	xx	
	AS market: Average volume 2025 (EUR m p.a.)	xx	xx	xx	
	AS market: Average development 2025-2030 (p.a.)	0.6%	-xx%	xx	xx
	AS market: Average volume 2030 (EUR m p.a.)	xx	xx	xx	

	strongly increasing ↑	increasing ↗	constant →	decreasing ↘	strongly decreasing ↓
Volume:	> +5.0% p.a.	+2.0% to +5.0% p.a.	0.0% to +2.0% p.a.	-2.0% to 0.0% p.a.	< -2.0% p.a.
Stock:	+1.5% p.a.	+0.5% to +1.5% p.a.	-0.5% to +0.5% p.a.	-1.5% to -0.5% p.a.	< -1.5% p.a.

Launch orders for innovative **alternative drive locomotives have** partly been **delayed** (e.g., due to complex homologation processes).

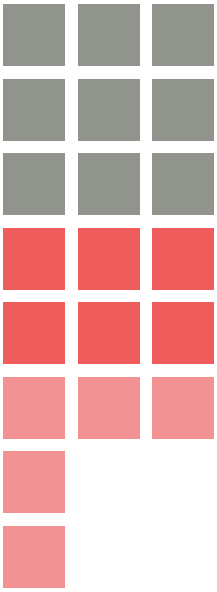
(…)

In the Western European mainline locomotive market (in particular, the large **German market**), this was already observable in the last few years. Here, **dual mode locomotives have (…)**

(…)

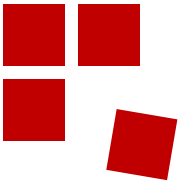
SCI Verkehr is forecasting that the market volume for diesel and alternative drive locomotives will soon be approaching the threshold of EUR xx billion per year.

(…)

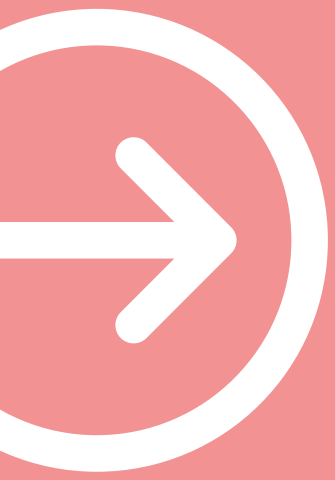


xx% of the worldwide installed base is accounted for by North America, the CIS region and Asia. Most of the mainline fleet consists of xx locomotives (87%). (…)

Within the shunting segment, higher powered locomotives are dedicated to the heavy shunting and universal segment, accounting for xx% of the shunting fleet.



Alternative drive locomotives
are expected to account for almost
xx% of the aggregated OEM volume from 2026 to 2030



Trends and drivers impacting the diesel and alternative drive locomotives market

1

SCI Verkehr has been observing a declining overall fleet: Increasing alternative drive locomotive fleets (…)

SCI Verkehr has been observing a declining overall fleet: Increasing alternative drive locomotive fleets (…)

In (…) world market region, the **fleet of diesel locomotives** is on a **decreasing** trend **due to** (…).

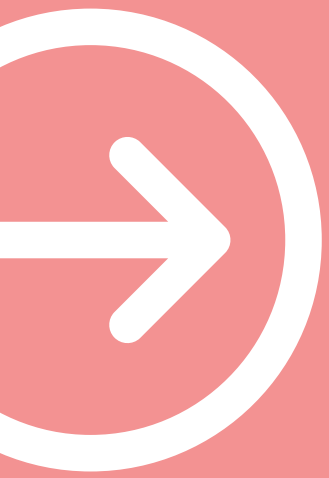
- **Higher efficiency of new assets**: In general, new locomotives entering the markets provide (…).
- **Track electrification is proceeding:** In some regions like (…), track electrification is proceeding at a high speed, making it possible to withdraw mainline diesel locomotives in particular from service. This trend was most pronounced in (…).
- **The (…) segment is losing further importance:** (…) locomotives within the (…) are increasingly replaced by non-locomotives (road-rail-vehicles or shunting robots).
- **Low (…) activities in recent years**: In the last decade, countries with large fleets like (…) have significantly decreased their diesel locomotive procurements. As a result, (…).
- (…)

-xx%

Decreasing fleet of diesel and alternative drive locomotives

Global fleet reduction since the predecessor study in 2023

Overall, **SCI Verkehr expects the trend of a decreasing (...) fleet to continue**. The mainline locomotive fleet is forecast to (…) at a CAGR of xx%, and the shunting locomotive fleet at a CAGR of xx%, within the period from 2025 to 2030.



Trends and drivers impacting the diesel and alternative drive locomotives market

2

Almost every market area will be dependent on (…)

(…)

The mainline railway network (excl. urban transport) in (…).

(…)

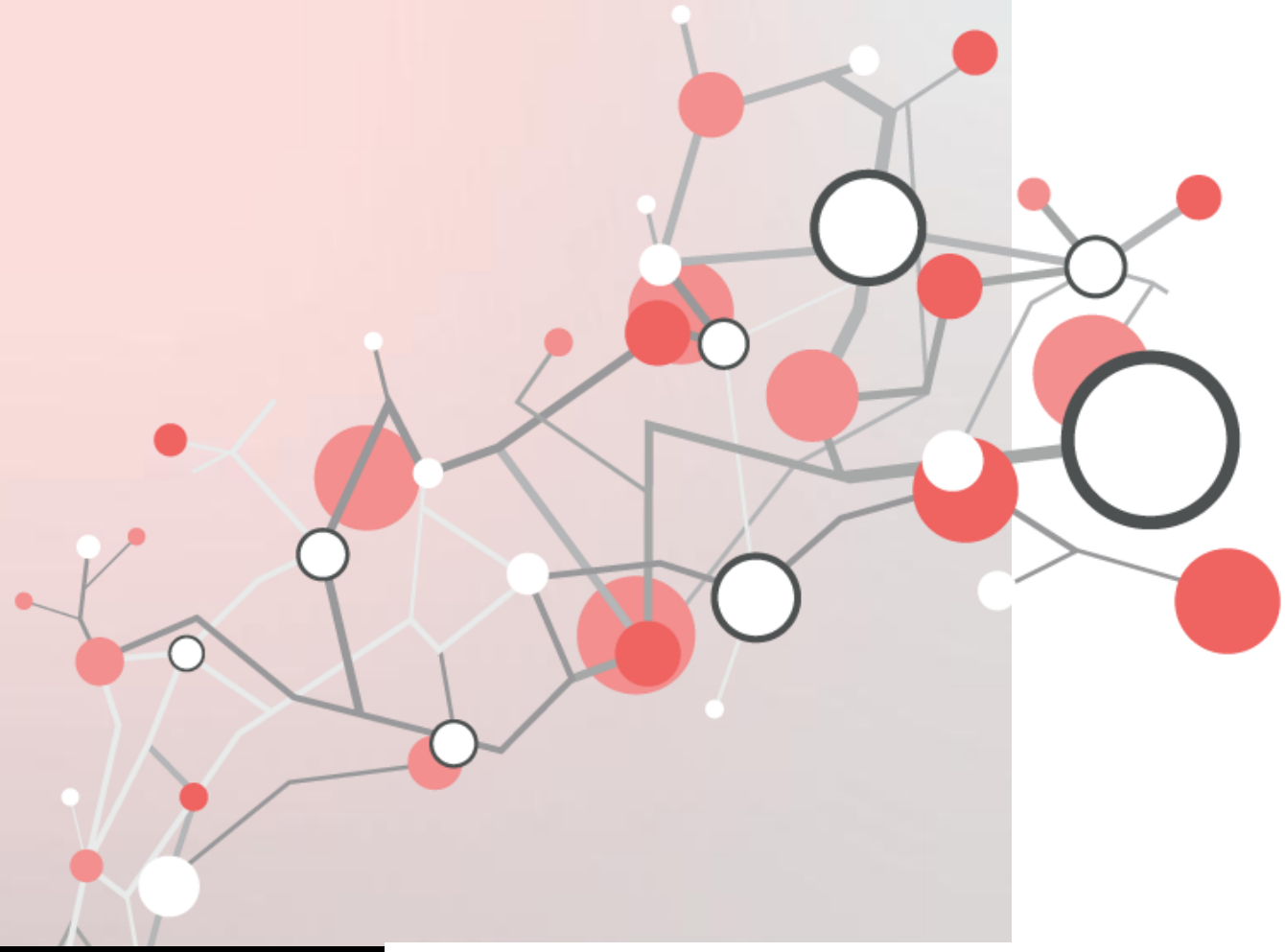
In the individual market regions, the degree of electrification varies between 2% (North America) and (…).

(…)

- Dual-mode locomotives (pantograph and diesel engine or battery module) will be used in markets with a significant degree of electrification.
- (…)
- Due to the missing infrastructure (e.g. refueling) for (…).

Degree of mainline electrification
(% of route-km)

Asia xx%
Europe 54%
(…)



7

The market for diesel and alternative drive locomotives in Australia/Pacific

2 The market for diesel and alternative drive locomotives in Australia/Pacific

2.1 Overview of the region

2.1.1 Executive summary

Australia/Pacific – diesel and alternative drive locomotives		Mainline	Shunting	Total	Trend
Installed base	Units 2025	xx	xx	xx	
	Average development 2025-2030 (p.a.)	xx	xx	xx	↘
	Average age 2025 (in years)	xx	>40	xx	
OEM market	Average volume 2025 (EUR m p.a.)	xx	xx	xx	
	Average development 2025-2030 (p.a.)	xx	xx	xx	↘
	Average volume 2030 (EUR m p.a.)	xx	xx	xx	
After-sales market	Average volume 2025 (EUR m p.a.)	355	xx	xx	
	Average development 2025-2030 (p.a.)	xx	-2.3%	xx	↗
	Average volume 2030 (EUR m p.a.)	xx	xx	xx	

strongly increasing | increasing ↗ | constant → | decreasing ↘ | strongly decreasing ↓

Medium-term implications for the <u>mainline</u> OEM and after-sales market (2026-2030)

- **Fleet evolution**: The overall fleet will (…) due to the (…).
- **OEM**: Until 2024, the OEM market has (…). Given the replacement needs in the region and the already-secured orders, especially those for (…), the OEM volume is expected to (…). After this period, procurement activity (…)
  - **Diesel**: Most expected deliveries will (…).
  - **Alternative traction**: Battery locomotives will (…). Solutions such as the Wabtec FLXdrive are significantly more (…).
- **After-sales**: Is projected to increase despite (…). In addition, fuel-efficiency measures and component-focused retrofit investments, such as upgraded starter-battery systems, will support (…).

Medium-term implications for the <u>universal/shunting</u> OEM and after-sales market (2026-2030)

- **Fleet evolution**: (…)
- **OEM**: The OEM market for shunting locomotives has (…). However, the overall demand for modern shunting locomotives will (…).
- **After-sales**: (…)

Long-term outlook for the OEM market for diesel and alternative drive locomotives (after 2030):

- **Mainline**: Demand is expected to remain (…). Most procurements will continue to focus on modern, fuel-efficient (…). Alternative-drive locomotives will (…). Private mining operators are likely to transition their fleets to alternative drives as part of their sustainability strategies. In the longer term, hydrogen tenders (…)**.**
- **Shunting**: Due to lower energy-density requirements, the replacement of (…).

2.1.2 General market overview

Fleet overview – diesel remains the dominant traction type in the region and the fleet is strongly focused on freight transport

- The majority of this fleet (more than 85%) is operated in Australia. The remaining fleet is operated in New Zealand and to a minor extent in Fiji.
- Around xx% of the mainline fleet is operating in freight mainline services.
- (…)

Installed base 2025 (units)	**Freight** mainline	**Passenger** mainline	**Shunting**	**Total**
Units	xx	xx	xx	xx
Alternative drive	xx	-	<1%	xx
Ø-age	xx	**38**	xx	xx

Political framework – characterised by (…).

- Australia and New Zealand have a **stable political environment** and dynamic economic development. (…) For rail freight, domestic economic growth is less relevant because volumes mainly depend on mineral ore exports to global markets.
- (…)
- Both economies rely on a few **key sectors**: Mining in Australia and (…) in New Zealand. Australia's rail freight volumes are closely linked to international commodity markets, creating exposure to weaker demand from major trading partners.
- (…)
- There is broad awareness that rail reduces emissions, congestion and safety risks. However, regulatory pressure to procure cleaner locomotives (…).

Infrastructure – long overland lines used for freight transport with only xx% electrified.

- The railway network is not **dense and is primarily used for freight transport**. Long-distance passenger transport services are limited to tourism trains and a few long-distance connections.
- In Australia, **railway systems** and infrastructure **are** (…)
- **New development and expansion projects in railway infrastructure are**:
  - In **Australia**, current investment focuses on completing key sections of the (…)
  - In **New Zealand**, the current **Rail Network Investment Programme** (2024-27) concentrates on (…)

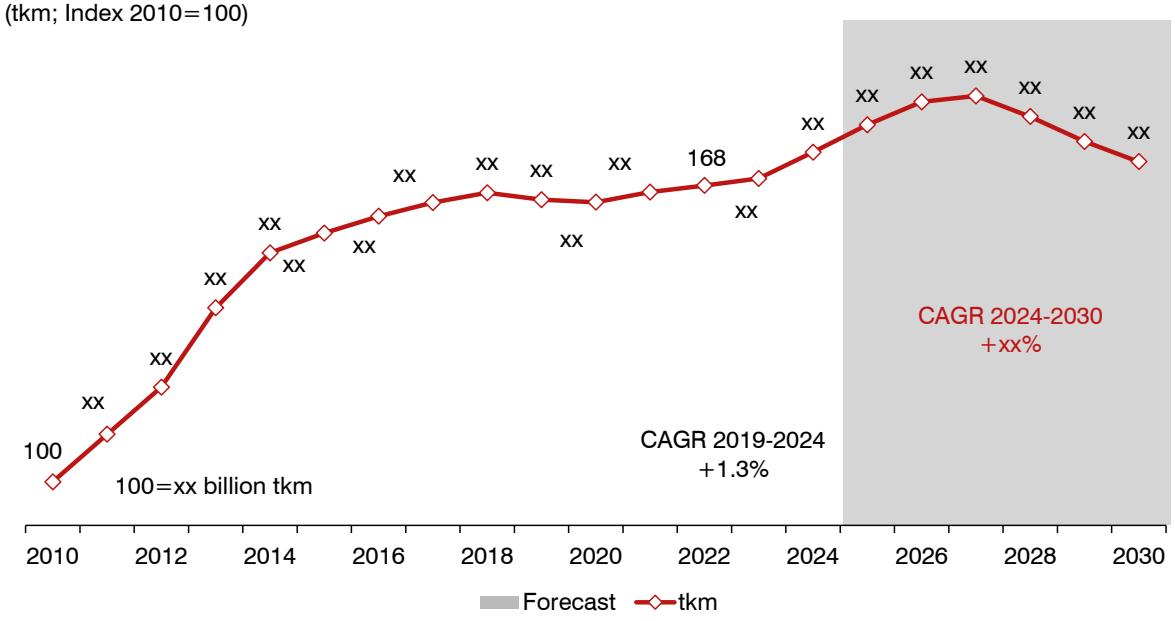
Rail freight market – expected to (…)

Rail transport in the region is almost entirely concentrated on Australia with a share of (…)

Country	Transport performance as of 2024 (bn tkm)	Share of total region performance	CAGR 2024-2030
Australia	xx	xx	xx
New Zealand	xx	xx	1.8%
Total	**468**	**100%**	xx

Especially between 2011 and 2014, rail freight transport performance in the Australia and Pacific region experienced strong growth reflecting the increasing production of iron ore. Since 2016, the growth rate has (…). Even during the Covid-19 pandemic, only a minor (…) driven by demand in Australia. New Zealand experienced a decline of xx% in the same period.

Development of rail freight performance in Australia and Pacific
(tkm; Index 2010=100)



Sources: National statistical agencies, UIC, SCI Forecast

Figure 1: Australia and Pacific - Rail freight performance development

Despite the positive development in the last years, rail freight transport performance in Australia (…)

– According to the (...).
– Although the performance loss of (…) cannot be replaced in the short term, there are still **positive developments** that will benefit the rail freight sector in the long-term. Besides mining products and, to a certain extent, agriculture, (…)
  (…)

Important recent developments in the region

– **Australia (Western) – government aims to reclaim control over rail network:** In January 2025, the government of Western Australia announced plans to (…).
– (…)

Passenger rail market – stable growth through metropolitan expansion and (…)

2.1.3 Mainline locomotives

In the Australia/Pacific region, the diesel mainline locomotive fleet comprises a total of around **xx locomotives** with an average age of xx years and can be characterised as follows:

- **Fleet development:** (…)
- **Age profile:** ~40% of the installed base has exceeded a service life of xx years. While the fleet in Australia is around xx years old on average, the fleet in New Zealand is xx years old on average.
- **Application:** Mainline diesel locomotives in Australia and the Pacific are used predominantly for (…)
- **Ownership/operators:** (…)
- **Leasing:** Lessor Rail First Asset Management leases locomotives in Australia and occasionally invests in new assets. The Rail First fleet comprises both (…).

Installed base of diesel and alternative drive mainline locomotives in Australia/Pacific

Traction type of installed base 2025	Diesel-electric	Diesel-battery	Total
Total (%)	xx	xx	**100%**
Total (units)	xx	<5	**xx**
			© SCI Verkehr GmbH

Almost 95% of the diesel mainline locomotives are operated in (…).

Installed base of diesel and alternative drive mainline locomotives in Australia/Pacific 2025
xx units)

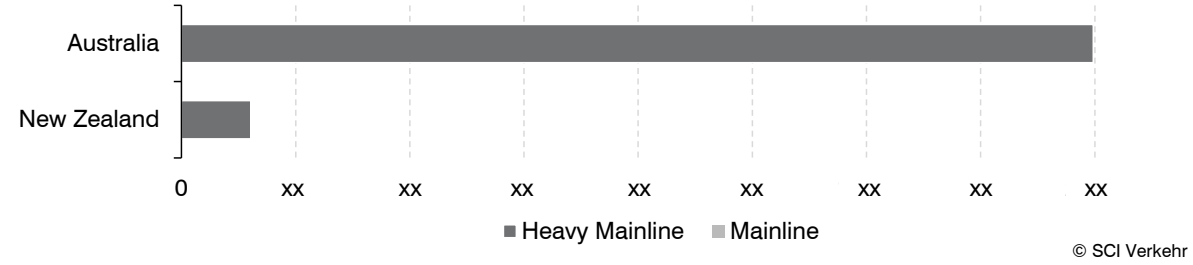


Figure 2: Installed base of diesel and alternative drive mainline locomotives in Australia/Pacific 2025

Procurements of diesel mainline locomotives in (…)

Alternative drives (…)

Age structure of diesel and alternative drive mainline locomotives in Australia/Pacific 2025
(xx units)

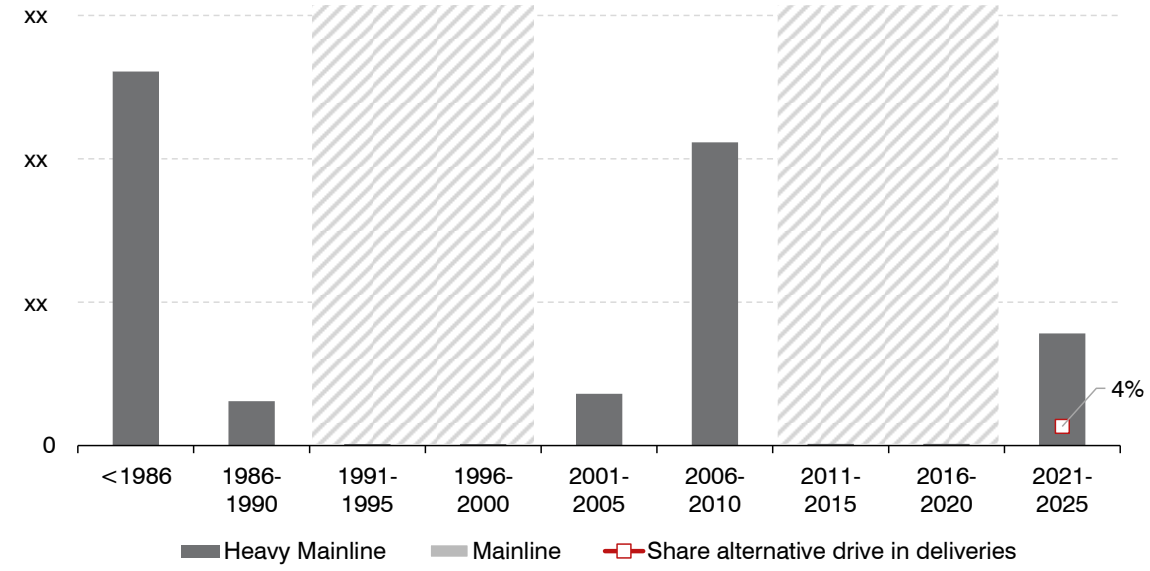


Figure 3: Age structure of diesel and alternative drive mainline locomotives in Australia/Pacific 2025

Ownership and leasing

(…)

"Traditional" private operators are currently focusing on conversion or rebuild measures to reduce emissions within their existing fleets, while mining companies (…).

– **Pacific National** is developing a climate action strategy that combines operational efficiency measures and digital fuel optimisation tools. It is exploring options like (…).
– **Aurizon** (…).
– **KiwiRail** aims to reduce carbon emissions by 40% by 2035 and to reach net-zero carbon by 2050. Its strategy combines the procurement of new efficient diesel locomotives and infrastructure upgrades, underpinned by a detailed carbon reduction plan.
– (…)

Owner of diesel and alternative drive mainline locomotives in Australia/Pacific 2025

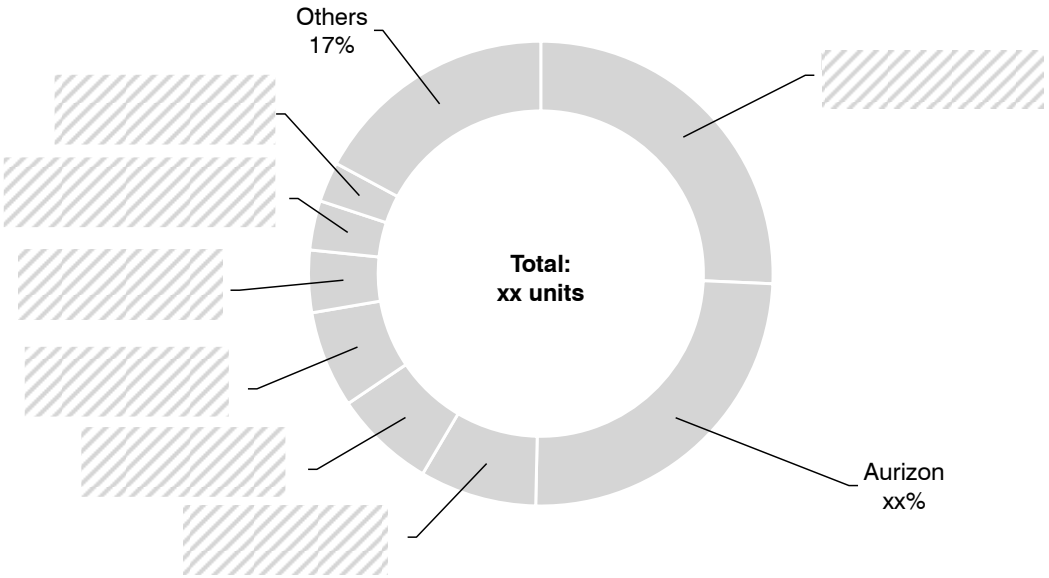


Figure 4: Owner of diesel and alternative drive mainline locomotives in Australia/Pacific 2025

Manufacturers/products/market shares

The Australian/Pacific region has local production capacities for the manufacture of diesel locomotives. In general, construction has taken place under license from (…). Over the past five years from 2021 to 2025, operators in the region have received about xx mainline locomotives.

- **UGL Rail** (…).
- **Progress Rail** (…)
- **CRRC**, despite its substantial global presence, has been less visible (…)
- **Stadler** has established a footprint in New Zealand through a large order of DM-class SALi diesel-electric locomotives, which are (…)

The most important diesel mainline locomotives in the market region are the following:

- **C44ACi**: Widespread locomotive type designed by UGL and Wabtec but built in (…).
- **(…)** Locomotive type able to operate at 115 km/h at a power output of 3,356 kW that was built under license from EMD in Australia until 2014. Recently ordered locomotives are being built in Progress Rail's US plant in Indiana.
- (…)
- **CKD9B**: CRRC locomotive for the narrow-gauge railway in New Zealand, with a diesel engine power of 2,700 kW (20 V 4000 R43 engine from MTU) and engine emission standards in compliance with EU Stage IIIA.
- **(…)**

In the alternative drive mainline segment, only the (…) locomotive is active. The locomotive is a battery-only locomotive that can recharge (…).

Deliveries of diesel and alternative drive mainline locomotives in Australia/Pacific by manufacturer
2021-2025

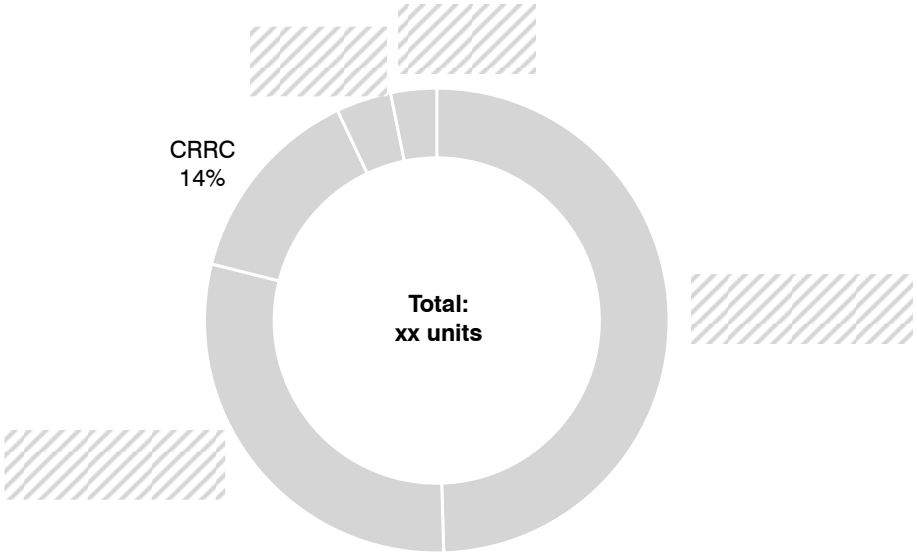


Figure 5: Deliveries of diesel and alternative drive mainline locomotives in Australia/Pacific by manufacturer

Market volume and market development

The current market volume for new diesel and alternative drive locomotives in the Australia/Pacific region is around EUR xx million p.a.; for after-sales services, it is around EUR xx million p.a.

The market development is influenced by the following drivers:

Drivers of procurement	Brief description	Relevance & Trend		
			Diesel	Altern.
Investment power	– Investment decisions remain (…). – New (…) locomotives (…) are expected to be significantly higher priced than diesel locomotives. Launch clients (…) need to decrease their vehicle emissions as part of achieving ESG goals. – Replacement programmes advance selectively, supported more strongly in New Zealand through government-funded renewal initiatives, while Australian operators follow stricter commercial return requirements.	◑	xx	xx
Technology trends	– (…) improvements in fuel efficiency and equipment performance. – With (…) electrification in the region, emission reduction can (…) be achieved through (…). – Digital optimisation tools (trip optimisation, fuel management, idle reduction) are increasingly deployed.	◕	xx	↗
Environment	– (…) – (…)	◑	xx	xx
Obsolescence	– A significant share of the fleet is more than xx years old, which (…). – (…)	xx	↗	xx
Asset availability/ maturity	– Several manufacturers are currently present in the market – these are from North America, China and (…), along with a domestic player offering a variety of diesel versions. The first battery-only locomotive has entered the market as well. – (…)	xx	xx	xx

Drivers of procurement	Brief description	Relevance & Trend		
			Diesel	Altern.
Transport demand	– Freight demand in Australia remains (…). – Long-term infrastructure programmes such as Inland Rail in Australia and (…).	◕	xx	xx

Relevance for procurement: ●= very high, ◕ = high, ◑ = medium, ◔ = low, ○ = none

5-year trend: strongly increasing ↑, increasing ↗, constant →, decreasing ↘, strongly decreasing ↓

Important current and planned procurement projects

A selection of the most relevant new procurement projects in Australia/Pacific region is presented in the following table.

Diesel locomotives:

Country	Vehicle type	Units	Diesel power (kW)	Delivery period	Remarks
Australia	C44aci	xx	xx	2025-2027	(…)
Australia	xx	xx	xx	xx	Narrow-gauge locomotives to CBH Group built by Wabtec in Brazil.
Australia	xx	xx	xx	xx	To Manildra Group from Progress Rail.
Australia	GT46C ACe	xx	xx	xx	(…)
Australia	C44aci	12	3,355	2024-2025	For leasing company Rail First; six units leased to SCT Logistics.
Australia	xx	xx	xx	xx	(…)
(…)					
New Zealand	SALi	xx	xx	2024-2028	First 4 locomotives delivered, as of end 2025.
New Zealand	xx	xx	xx	2022	CRRC delivered (…).

Alternative drive locomotives:

Country	Vehicle type	Units	Power (kW)	Delivery period	Remarks
Australia	FLXdrive	xx	xx	2024	For Rio Tinto's Western Australian rail network.
(…)					

2.1.4 Shunting locomotives

The diesel and alternative-drive shunting locomotive fleet in the Australia/Pacific region comprises xx locomotives with a very high average age of more than xx years and can be characterised as follows:

– **Fleet development**: The overall fleet size has decreased over (…).
– **Age profile**: More than 80% of the installed base has exceeded xx years of service life.
– **Application**: Around xx% of the fleet is used for industrial or light shunting operations. Shunting locomotives are also deployed in (…)
– **Ownership/operators**: (…)

Installed base of diesel and alternative drive shunting locomotives in Australia/Pacific

Traction type of installed base 2025	Diesel-electric	Diesel-mechanic	Battery	Total
Total (%)	62%	xx	xx	**100%**
Total (units)	xx	xx	xx	**xx**
				© SCI Verkehr GmbH

The light shunting locomotives of the installed base are mainly the two-axle locomotives of the Fiji Sugar Corporation.[1] The largest shunting locomotive fleet is operated in Australia (~xx%).

(…)

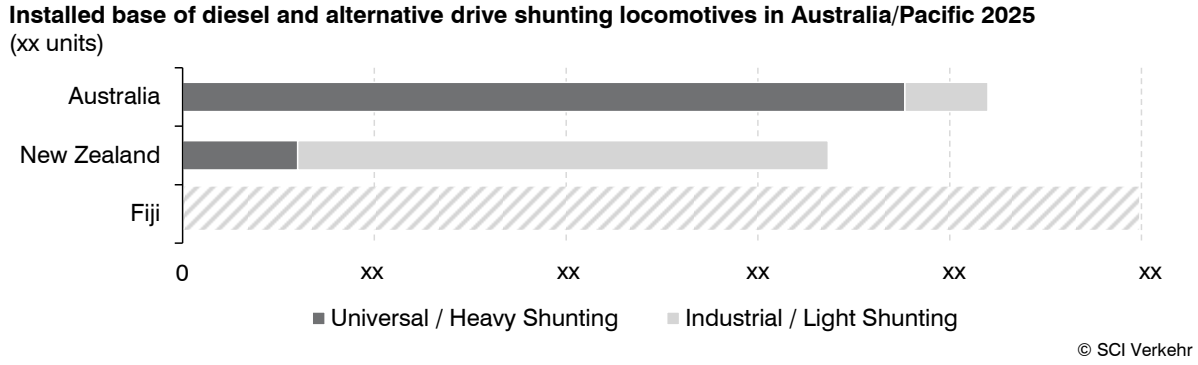


Figure 6: Installed base of diesel and alternative drive shunting locomotives in Australia/Pacific 2025

The shunting fleet in the region is very old, as more than (…).

(…)

[1] Locomotive fleet data partly generated in high-level assessments of SCI Verkehr. Data availability in Fiji is inadequate.

Age structure of diesel and alternative drive shunting locomotives in Australia/Pacific 2025
(xx units)

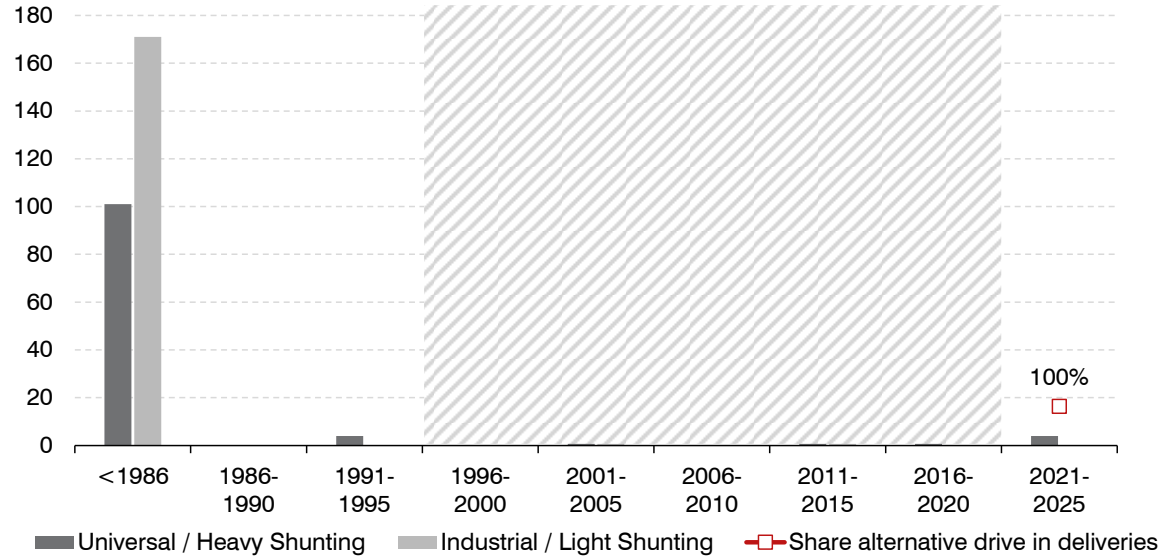


Figure 7: Age structure of diesel and alternative drive shunting locomotives in Australia/Pacific 2025

Ownership/operatorship

Several industrial shunting locomotives are (…)

Owner of diesel and alternative drive shunting locomotives in Australia/Pacific 2025

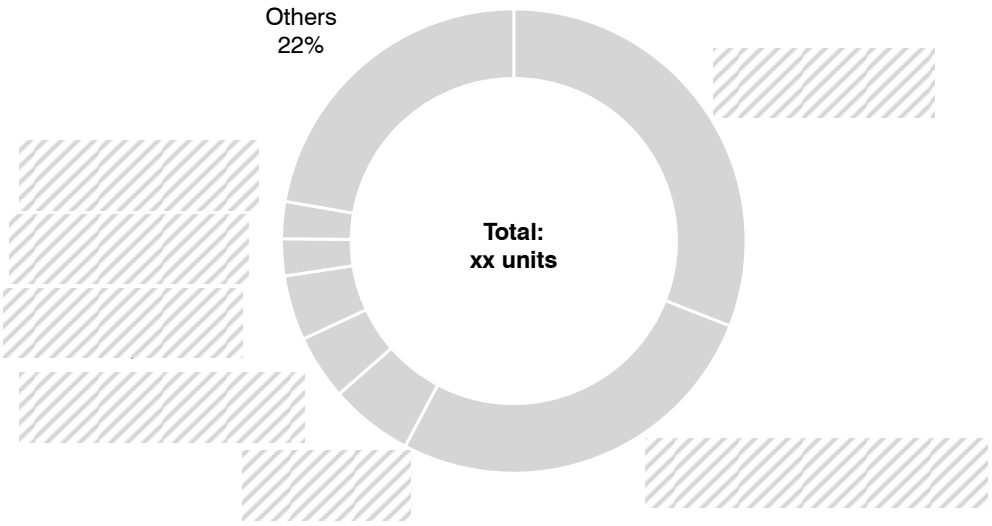


Figure 8: Owner of diesel and alternative drive shunting locomotives in Australia/Pacific 2025

Manufacturers/products/market shares and deliveries

Between 2021 and 2025, (…) shunting locomotives were delivered to the Australia/Pacific market. These units were (…) delivered to BHP and (…). The locomotives are based on the (…). As a powerful switcher locomotive, SCI Verkehr dedicated the locomotives to the universal shunting segment, but mainline operation is possible as well.

Stadler is developing (…) are expected in New Zealand in spring 2027.

Schalke Locomotives will (…).

Market volume and market development

The current market volume for new shunting locomotives in in the Australia/Pacific region is around EUR xx million p.a.; for after-sales services, it is around EUR xx million p.a.

The market development is influenced by the following drivers:

Drivers of procurement	Brief description	Relevance & Trend		
			Diesel	Altern.
Fleet structure	– The existing fleet is very old and therefore partly requires (…). – (…)	xx	xx	xx
Asset availability/ product maturity	– (…). – (…)	◕	xx	↗
(…)				

Relevance for procurement: ● = very high, ◕ = high, ◑ = medium, ◔ = low, ○ = none

5-year trend: strongly increasing ↑, increasing ↗, constant →, decreasing ↘, strongly decreasing ↓

Important current and planned procurement projects

Diesel: (…).

Alternative drive:

Country	Vehicle type	Units	Power (kW)	Delivery period	Remarks
Australia	xx	2	xx	2026	(…)
Australia	EMD Joule	2	xx	xx	(…)
Australia	xx	xx	xx	2025	For BHP (…).
(…)					
New Zealand	xx	xx	xx	2027-2028	Centre cab narrow gauge shunters from (…).
(…)					

SCI Verkehr GmbH is an independent medium-sized management consultancy focused on strategic issues in the international rail, infrastructure and logistics business. We know our markets worldwide and have been supporting our international clients in the development and realisation of their strategies since 1994.

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